

549,923

Rec'd PCT/PTO 19 SEP 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



10/549923

(43) International Publication Date  
30 September 2004 (30.09.2004)

PCT

(10) International Publication Number  
WO 2004/082386 A1(51) International Patent Classification<sup>7</sup>:

A21B 3/15

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:

PCT/DK2004/000178

(22) International Filing Date: 18 March 2004 (18.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

BA 2003 00094 20 March 2003 (20.03.2003) DK  
PA 2004 00023 9 January 2004 (09.01.2004) DK

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicants and

(72) Inventors: POULSEN, Jens, Marius [DK/DK]; Egetoften 18, Nymindegab, DK-6830 Nørre Nebel (DK). PIHL, Bo [DK/DK]; Vestervang 1C, Nørre Bork, DK-6893 Hemmet (DK).

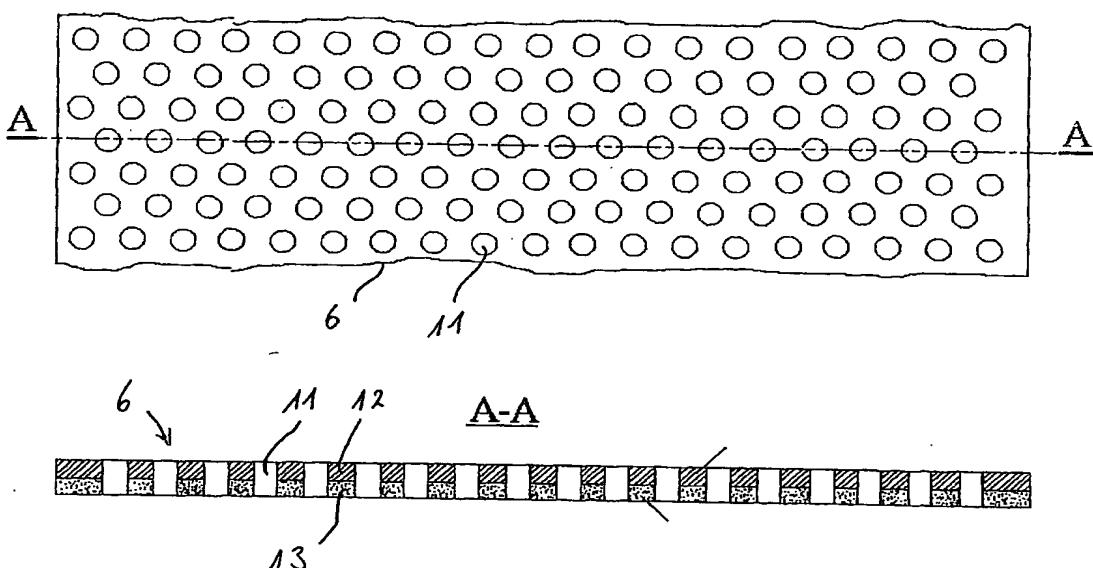
(74) Agent: PATRADE A/S; Fredens Torv 3A, DK-8000 Århus C (DK).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FLEXIBLE ROASTING SUPPORT WITH PERFORATIONS



WO 2004/082386 A1

(57) Abstract: A flexible roasting support for placement on a grid in a fan oven comprising a flexible sheet (6), for example a heat resistant paper foil, with perforations (11) distributed over the sheet for circulation of heating air through the perforations.

## Flexible roasting support with perforations

### FIELD OF THE INVENTION

5 The present invention relates to a flexible roasting support with perforations, for example a flexible paper or polymer foil.

### BACKGROUND OF THE INVENTION

10 When roasting potatoes, for example French fries, in an oven, the fries may only get crispy on the upper side and stay soft on the lower side, because of moisture and fat that stays on the pan underneath. In order to get the fries crispy on all sides, the fries have to be turned. However, the latter procedure is tedious and implies a danger of injury for the person handling the fries, because the oven, the pan and the fries are very hot.

15 In order to improve baking or roasting results, a number baking containers have been disclosed concerning the problem of leading melting fat away from the supported food product. Such disclosures are found in Japan patent application JP10295550 by Isogay Atsutoshi, UK patent applications GB 2 295 308 by John Francis Gordon and GB 2 20 364 772 by William and Mark Rowley.

However, even though the fat may be led away, the fries are subject to an uneven roasting result. There is therefore a need for improvement such that the roasting result is more satisfactory.

25

### DESCRIPTION / SUMMARY OF THE INVENTION

It is therefore the object of the invention to provide means for improved roasting of food product, especially potato fries.

30

This object is achieved by a flexible roasting support for placement on a grid in a fan oven, the support comprising a flexible sheet with perforations distributed over the sheet for circulation of heating air through the perforations.

5 As thorough study of the problem has revealed, use of a sheet according to the invention improves the result for roasting of potato fries and other food product dramatically over known methods. The perforation allows the hot air in the fan oven to circulate through the perforations such that the food product not only is roasted by the air above the food product but also by the air beneath it.

10

It has to be understood that the invention is not limited to be placed on a grid, as other means may be used which allows air to flow through the material.

15 In principle, an improved result as compared to prior art could be achieved by placing the fries directly on the grid in the fan oven. However, fries and other related food product would fall through the openings in the grid, which does not lead to a desired result. By having a sheet with openings substantially smaller than the pieces of food product to be roasted, this is prevented. Also, the perforation of the sheet according to the invention may be adjusted to special uses, for example for roasting potato fries, roasting small pieces of vegetables, etc. Another reason for not placing the food product directly on the grid is the danger of the food product sticking onto the grid. This is especially the case for potato chips or fries getting soft during the first part of the roasting process.

20

25 Another advantage of the circulation through the perforations is a reduced time for roasting or baking, which in turn results in lower energy consumption.

30

A sheet according to the invention may be supplied in the same way as heat resistant paper or polymer foils that already today are used for baking and roasting. However, the difference is the holes in the sheet, which allow hot air to circulate through and improve the result by the baking or roasting process. In contrast to material that is used for microwave ovens, where a susceptor is built into the material, the sheet mate-

rial according to the invention may be a low-cost susceptor-free material, for example paper.

5 In order to remove potato chips or other food product from the sheet, the sheet may be gripped at the corners and lifted from the grid by which the sheet deforms into a bag for easy transport of the chips or other food product. As the sheet is very thin, the heat capacity is low preventing burning of fingers when gripping the sheet.

10 The sheet material according to the invention may be improved with a surface being a non-sticking layer, which facilitates the removal of the food product from the sheet. For example, this may be achieved with a heat resistant paper foil with a silicone top layer.

15 As it is known from paper used for baking, the sheet according to the invention may be dispensed from a roll of such sheet material or it may be delivered in ready-to-use pre-cut sheets, for example having a size adapted to a specific size of the fan-oven. The size of such ovens may vary from large ovens for professional use to small table-top mini ovens. Also, the sheet according to the invention may be made of single-use, disposable foil, for example of paper or polymer or a combination thereof. Alternatively, the sheet according to the invention may comprise or consist of a metal foil, for 20 example aluminium.

25 In a further embodiment of the invention, the sheet of the flexible roasting support according to the invention may comprise a fat absorbing layer in order to absorb the fat that may melt from the supported food product. In addition this layer may absorb dispensed liquid from the food product. This way, it is assured that the food product is not lying in the fat and/or liquid, which reduces the amount of fat with the food product and also may improve the roasting result. For example, the sheet may comprise a smooth upper layer and a fat absorbing lower layer for absorption of fat flowing from the smooth layer through the perforations. Alternatively, the fat absorbing layer may 30 be coated with a smooth layer for easy removal of the roasted or baked food product,

for example where the smooth layer allows fat to migrate through the layer, such as a paper sheet with a silicone layer, wherein the silicone layer is fat migrative.

5 Though the invention is intended for use on a grid or other means with openings in an oven, it may be used also on a solid plate in an oven. In this case, the benefit of the air flow through the sheet is not available, but for the fat absorbing properties, a sheet with perforations may still improve the roasting result because the contact of the food with the fat is reduced.

10 Alternatively to a single-use disposable sheet, the sheet may be made of a single layer of re-use polymer foil, for example comprising tetrafluorethylene, also known as Teflon®. Such re-use material may be washable material.

15 The sheet according to the invention should be heat resistant up to the temperature at which it is desired to be used. For example, the sheet could be constructed to withstand a temperature of 200°C, or rather 220°C, or higher.

20 The perforations of the sheet may be evenly distributed over the sheet. The advantage is a ratio between open area and closed area independent of the location on the sheet. Thus, if the size of a sheet is adjusted, for example by cutting, to the size of a fan oven, for example a small table-top model, there is still a possibility of an even circulation through the sheet.

25 However, in cases, where it is evident that the air circulation in the central part of the oven is higher than at the borders or vice versa, the sheet may have varying density of perforations or different sizes of the opening in order to ensure an even air circulation through the sheet. Thus, the flexible roasting support according to the invention may comprise perforations have a varying density over the sheet adapted for the specific air flow in the fan oven for ensuring even air circulation through the sheet when used in a fan oven. If regarded as advantageous, the distribution of perforations may be asymmetrically over the sheet.

Experiments have shown that good results for baking/roasting can be achieved with an area of the perforations of 10-50% or rather 25-40% as compared to the total area of the sheet.

5

### SHORT DESCRIPTION OF THE DRAWINGS

The invention will be explained in more detail with reference to the drawing, where FIG. 1 shows a prior art system with a fan oven and a plate with food product, FIG. 2 shows a fan oven with a sheet according to the invention on a grid, FIG. 3 shows a possible embodiment with a sheet roll, FIG. 4 shows a possible embodiment of the invention with a fat absorber.

10

### DETAILED DESCRIPTION / PREFERRED EMBODIMENT

15

FIG. 1 shows a prior art system with a fan oven 1 inside which air circulates above 2 the plate 3 and below 4 the plate 3. The air stream 4 below the plate 3 with the food product 5, for example potato chips, heats the plate 3, which disadvantageously may result in the food product being heated more by the plate 3 than by the air stream 2 circulating above the plate 3. The result may be burned food product, for example chips. In case that fat or liquid leaves the food product 5, the food product may be prevented from being crisp on one side. Both situations are normally wanted to be omitted.

20

In contrast thereto, in FIG. 2, the flexible roasting support according to the invention in the form of a sheet 6 placed on a grid 7 allows air circulation 8 through the perforation, which is illustrated by arrows 9, 9' with all the advantages that have been described above.

25

FIG. 3 illustrates a possible embodiment, where a sheet/foil 6 according to the invention is provided as part of a roll 10. Thus, sheets 6 for baking or roasting may be dispensed from the roll 10, for example for single use and following disposal. As illustrated, perforations 11 may be evenly distributed over the sheet 6.

30

FIG. 4 illustrated a part of a sheet 6 according to the invention with circular holes as perforations 11. However, holes may have a different shape, if desired. As a cross section A-A reveals, the sheet 6 may be a sheet with more than one layer. For example, the upper layer 12 may be a non-stick layer for assuring that food product is easily removed from it. The lower layer 13 may be a fat absorbing layer for absorbing fat that flows through the holes 11.

Other combinations of layers are possible, for example paper sheets with fat absorbing properties on which a fat migrative layer is provided. Such two layer system or even other multilayer systems may be provided by a variety of production methods, for example as a laminate or as foils onto which other layers are provided by painting, spraying, melting.

## CLAIMS

1. A flexible roasting support for placement on a grid in a fan oven, the support comprising a flexible sheet with perforations distributed over the sheet for circulation of heating air through the perforations.  
5
2. A flexible roasting support according to claim 1, wherein sheet is susceptor-free.
3. A flexible roasting support according to any preceding claim, wherein the perforations are evenly distributed over the sheet.  
10
4. A flexible roasting support according to claim 1 or 2, wherein the perforations have a varying density over the sheet adapted for the specific air flow in the fan oven for ensuring even air circulation through the sheet when used in the oven.  
15
5. A flexible roasting support according to claim 1 or 2, wherein the density of perforations or the size of the perforations varies from the centre of the sheet to the edge of the sheet adapted for the specific air flow in the fan oven for ensuring even air circulation through the sheet when used in the oven.  
20
6. A flexible roasting support according to any preceding claim, wherein the sheet comprises a fat absorbing layer.
7. A flexible roasting support according to claim 6, wherein the sheet consists of a fat absorbing paper sheet.  
25
8. A flexible roasting support according to any preceding claim, wherein the sheet comprises a smooth upper layer and a fat absorbing lower layer for absorption of fat flowing from the smooth layer through the perforations.
- 30
9. A flexible roasting support according to any preceding claim, wherein the sheet is made of single-use, disposable paper foil.

10. A flexible roasting support according to claim 8, wherein the sheet is a paper foil with a silicone top layer.

5 11. A flexible roasting support according to claim 10, wherein the silicone layer is fat migrative.

12. A flexible roasting support according to claim 1 or 2, wherein the sheet is made of a single layer of re-use polymer foil.

10 13. A flexible roasting support according to any preceding claim, wherein the sheet has an area of perforation between 10 and 50 %.

14. A flexible roasting support according to claim 13, wherein the area of perforation is between 25 and 40 %

15

15. A flexible roasting support according to any preceding claim, wherein the sheet has a size adapted to a specific type of fan oven.

16. A flexible roasting support according to any preceding claim as part of a roll.

20

1/3

Fig. 1

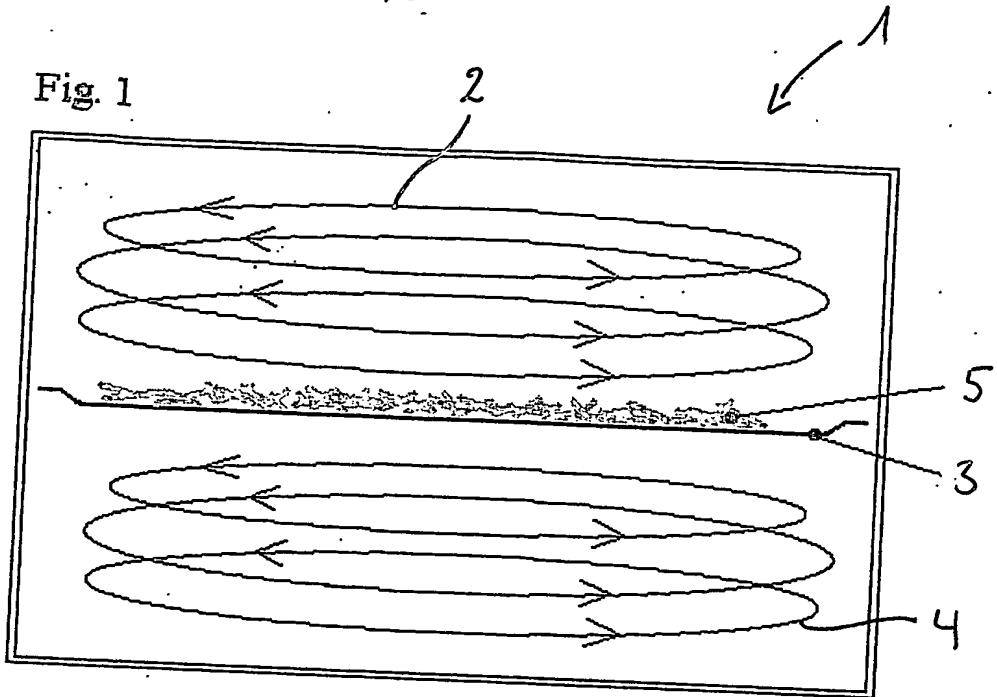
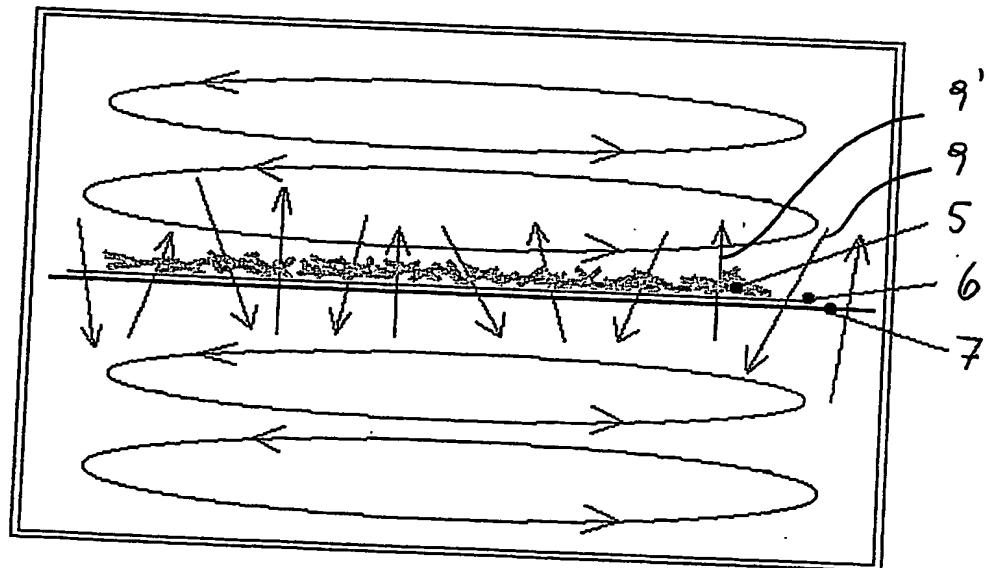
Prior art.

Fig. 2



2/3

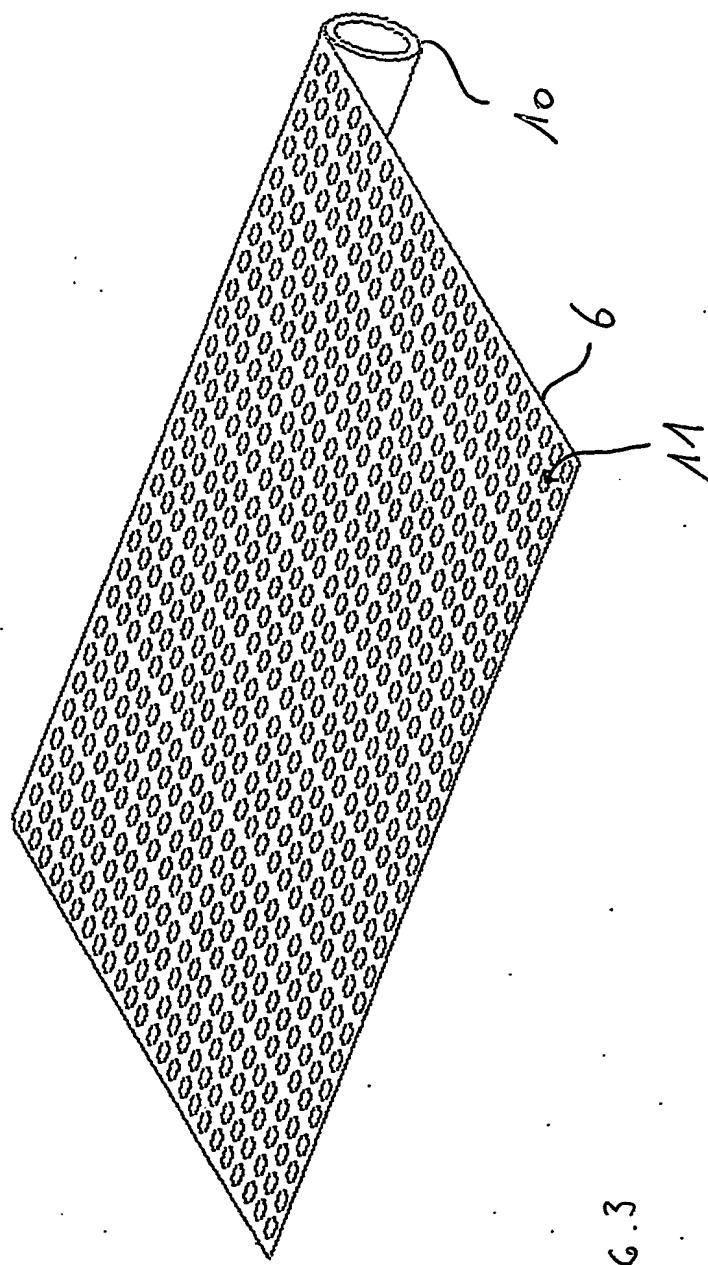


FIG. 3

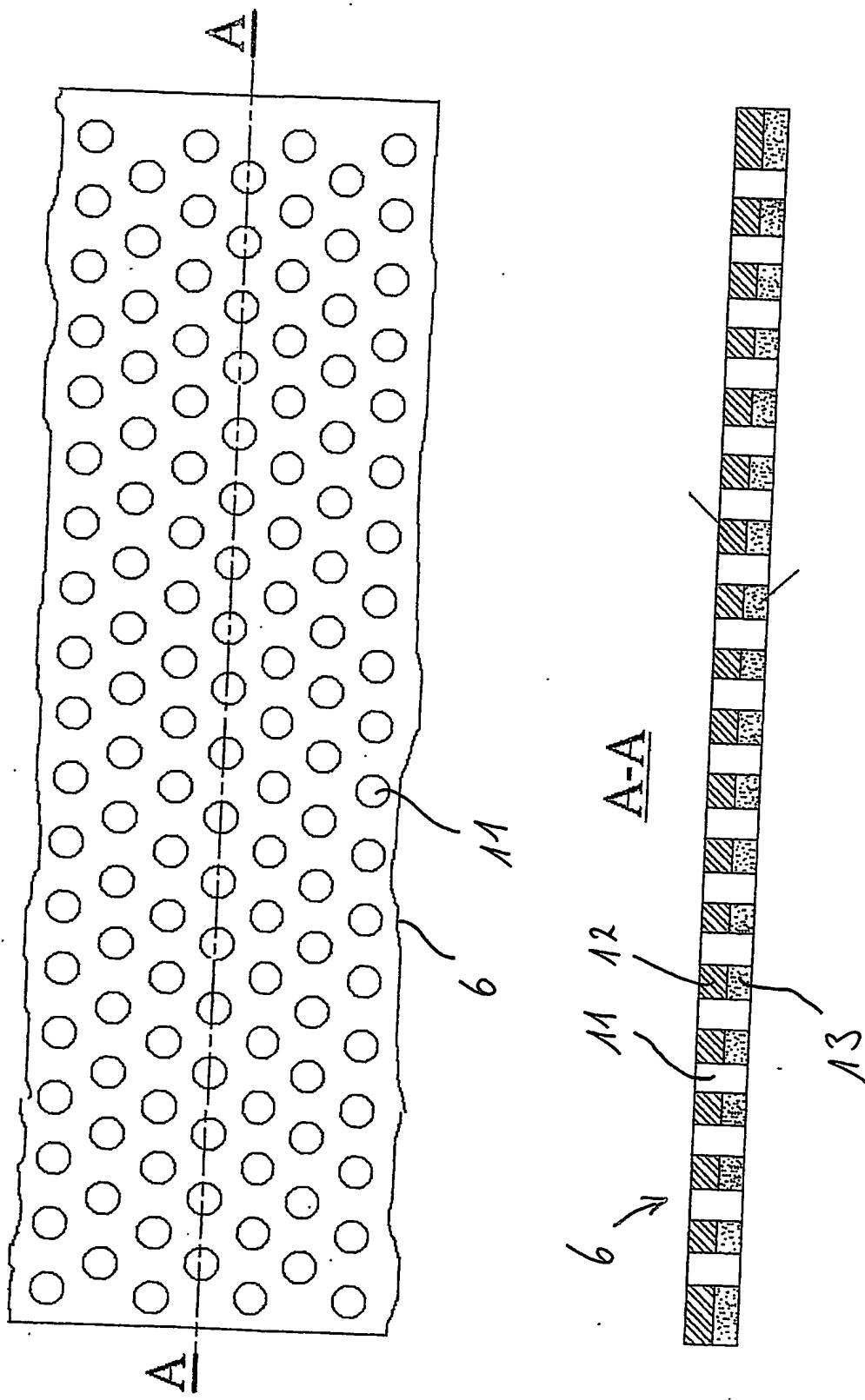


FIG. 4

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A21B3/15

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 A21B F24C A41B A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)  
EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 856 256 A (HARTMUTH WERNER) 5 August 1998 (1998-08-05) column 1, line 18 - line 28 column 2, line 27 -column 5, line 32; figures 1,3,4	1-3,9, 11,12,15
Y	---	10,11
X	US 4 763 639 A (GOLDSWORTHY KENNETH M) 16 August 1988 (1988-08-16) column 2, line 23 -column 3, line 20 column 3, line 41 - line 48; figures 11,3,5,6	1,4,5,16
X	US 6 184 510 B1 (ZUCKER DAVID) 6 February 2001 (2001-02-06) column 6, line 5 -column 7, line 39; figures 4A,B4B4C	1,6-8
	---	
	-/-	

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

24 June 2004

Date of mailing of the international search report

01/07/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Lehe, J

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 586 491 A (DILLER ROBERT J ET AL) 24 December 1996 (1996-12-24) column 2, line 64 -column 3, line 9; figure 1 --- GB 2 220 346 A (W D PERKINS LIMITED) 10 January 1990 (1990-01-10) abstract; figure 1 -----	1,13,14, 16
Y		10,11

## Information on patent family members

International Application No  
P DK2004/000178

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 0856256	A	05-08-1998	DE EP	29701878 U1 0856256 A1		10-07-1997 05-08-1998
US 4763639	A	16-08-1988		NONE		
US 6184510	B1	06-02-2001		NONE		
US 5586491	A	24-12-1996		NONE		
GB 2220346	A	10-01-1990		NONE		